

Table 4

Spice	May-89
Spice 2	Feb-94
Telemundo	Jan-87
Theatre Vision	May-93
The Travel Channel	Feb-87
Trinity Broadcasting Network	Apr-78
TV-Japan	Jul-91
U Network	Oct-89
Univision	Sep-76
ValueVision	Oct-91
The Weather Channel	May-82
WGN	Nov-78
Worship	Sep-92
WPIX	May-84
WSBK	Feb-88
WWOR	Apr-79

This table was derived from a study prepared by Economists, Inc. for the NCTA and was updated to reflect recent launches before July 30, 1994. NCTA Comments, Attachment C, Table 2; *America's Talking: High Hopes*, Cable TV Programming, July 25, 1994, at 2; *Cable Network Ownership*, Cable TV Programming, Aug. 29, 1994 .

Table 5

**Announced National Launches of Programming Services
For Cable Distribution**

*Programming Services Without a Cable
Operator Holding An Ownership Interest*

Action America
Applause
Arts & Antique Network
ATV
Auto Channel
Automotive Television Network
Booknet
Canal de Noticias/NBC
Career & Education Opportunity Network
CEO Channel
Collectors Channel
Cupid Network Television
Ecology Channel
Enrichment Channel
ESPN 3
Fashion & Design Channel
Filipino Channel
Fitness & Interactive Television
Game Show Channel
Gaming Entertainment Television
Global Mind Network
Global Village Network
Golden American Network
Golf Channel, The
Health & Fitness Channel
Health Channel
History Channel
History Network
Hobby Craft Network
Home Interactive TV
Horizons Cable
Idea Channel, The
Independent Film Channel

Table 5

The Interactive Channel
Military Channel
MOR/Aerobic Music
MOR/Classic Country
MOR/Classic Rock
MOR/Concert Music
MOR/Gospel Music
MOR/Spanish Music
National & International Singles Television Network
National Access
Network 1
New Culture Network
Ole TV
Our World Television
Ovation
Parent Television
Parenting Satellite TV Network
Parents Channel
Planet Central Television
Popcorn Channel
Recoverynet/ The Wellness Channel
S The Shopping Network
Sewing & Needles Arts Network
Single Information News Network
SingleVision
Sports Recreation News
Talk Channel
Talk TV Network
Telenoticias
TFN: The Fashion Network
Therapy Channel
TRAX
TV Macy's
World African Network
XTV

Table 5

*Programming Services With Ownership
Interests Held by Cable Operators*

BET Jazz
Catalog 1
Classic Sports Network
CNN International
Encore/Action
Encore/Love Stories
Encore/Mystery
Encore/True Stories
Encore/Tweens
Encore/Westerns
Game Net
Home & Garden TV
Jones Computer Network
Jones Health Care Channel
Jones Language Network
La Candena Deportiva
Music Video Store
Outdoor Life Channel
Product Information Network
Q2/On Q
Romance Classics
Sega Channel
Showtime Comedy Television
Showtime Family Television
Showtime Film Festival
Showtime/Action
Starz!
TCI/Bertelsmann channel
TCI/Microsoft PC Channel
Television Shopping Mall

Sources: *A Who's Who of New Nets*, Cablevision, May 9, 1994,
at 35A-45A; *Database*, Cablevision, June 6, 1994, at 54.

Table 6

Major MSO Ownership in National Programming Services

Services	Cablevision	Comcast	Continental	Cox	Jones	Newhouse	TCI 1/	Times Mirror	Time Warner	Viacom
Action Pay-Per-View 2/							21.40%		17.70%	
All News Channel 3/										100.00%
AMC	75.00%									
BET							21.40%		17.70%	
The Box 1/						4/	7.00%			
Bravo	50.00%									
Cable Health Club							18.00%			
Cartoon 5/	x		x		x		23.30%	x	19.50%	
Cinemax									100.00%	
CNN 5/	x		x		x		23.30%	x	19.50%	
Comedy Central									50.00%	50.00%
Court TV	16.70%						33.00%		33.00%	
Discovery				24.00%		24.00%	49.00%			
E!		10.30%	10.30%	10.30%		10.30%	10.30%		48.30%	
Encore							90.00%			
FAM							18.10%			
Flixi										100.00%
HBO									100.00%	
Headline News 5/	x		x		x		23.30%	x	19.50%	
HSN							80.00%			
HSN II							80.00%			
Learning Channel				24.00%		24.00%	49.00%			
Mind Ext. Univ.					100.00%					
Movie Channel										100.00%
MTV										100.00%
MTV Latino 3/										100.00%
Newsport 6/	25.00%						38.00%			
Nick at Nite 3/										100.00%
Nickelodeon										100.00%
Prime SportsChannel 7/	25.00%						38.00%			

Table 6

Services	Cablevision	Comcast	Continental	Cox	Jones	Newhouse	TCI 1/	Times Mirror	TW	Viacom
QVC 8/	x	16.40%	x			x	28.20%	x	10.70%	
QVC Fashion 8/	x	16.40%	x			x	28.20%	x	10.70%	
Request Television							9/			
Sci-Fi Channel										50.00%
Showtime										100.00%
TBS 5/	x		x		x		23.30%	x	19.50%	
Television Food Network			10/					10/		
TNT 5/	x		x		x		23.30%	x	19.50%	
Turner Movie Classic 5/	x		x		x		23.30%	x	19.50%	
USA										50.00%
VH-1										100.00%
Viewers Choice 11/		11.00%	12.00%	13.00%		11.00%		x	17.00%	11.00%

Unless otherwise noted, the source for all figures is *Cable Network Ownership*, Cable TV Programming, August 29, 1994, at 2-3. Ownership interests reported for earlier periods may not reflect current ownership. Includes both direct and indirect ownership interests.

1/ Liberty Media's interests are consigned to TCI. As of June 1994, Liberty Media reported its interests in BET as 18%, in The Box as 7%, in Family and Cable Health Club as 18% and in QVC as 18.5%. Liberty Media Comments at 9.

2/ A programming service of BET Holdings, Inc. See BET Holdings, Inc., 1993 Annual Report at 4.

3/ See Viacom Reply Comments at 1-2.

4/ As of May 24, 1993, Newhouse reportedly held a 17% interest in The Box. See John M. Higgins, *Bailout of Video Jukebox Network Crumbling*, *Multichannel News*, May 24, 1993, at 57.

5/ A programming service of Turner Broadcasting System. Interests marked by an "x" are less than 5% and together with smaller MSOs represent 32.8% ownership in TBS. See NCTA Comments, Attachment C, Table 4.

6/ As of September 1993. See Rachel Thompson, *CBS Dumps Public Affairs Network*, *Multichannel News*, Sept. 27, 1993, at 2.

Table 6

7/ As of January 1993. See Rich Brown, Prime Network, SportsChannel to Merge, *Broadcasting* January 11, 1993, at 4.

8/ All cable operators' interests less than 5%, marked by an "x," total 42% as of July 1993. See *Cable Network Ownership*, Cable TV Programming, July 30, 1993, at 6-7. Comcast and Liberty Media have reportedly created a partnership to hold QVC interests, through which Comcast would own 57.56% and Liberty would own 42.44% of QVC. *Cable TV Programming*, July 25, 1994, at 1.

9/ TCI's ownership in Request Television is unknown. However, as of April 1992, TCI together with News Corp. reportedly acquired a majority interest in the owner of Request Television, Reiss Media. See Sharon Moshavi, *TCI, News Corp Buy Stake in Reiss*, *Broadcasting*, April 6, 1992, at 11.

10/ Actual ownership percentages in TV Food Network are unknown, though Continental is reported to be a "primary owner" and Times Mirror a "minority owner." In addition to Times Mirror and Continental the following cable operators reportedly hold ownership interests in the Television Food Network: Scripps Howard (primary), Adelphia (minority) and CVI (minority). *Cable Network Ownership*, Cable TV Programming, Aug. 29, 1994, at 3.

11/ As of September 1993. See David H. Waterman & Andrew A. Weiss, *Vertical Integration in Cable Television*, Table 2-2, September 17, 1993. Cox's current ownership interest is reported as 20%. See *Cox /Times Mirror Deal Emphasizes Content*, Cable TV Programming, June 23, 1994, at 3.

Table 7

**Vertical Connection Between Major
Programming Services and Cable System Operators**

<u>Programming Network (Top 25)</u>	<u>Subscribers (millions)</u>	<u>MSO with Ownership Interest in Network</u>	<u>Launch Date</u>
ESPN	61.8	None	Sep-79
CNN	61.6	Time Warner 19.5%, TCI 23.3%, Times Mirror, Cablevision, Comcast, Continental, Jones, Lenfest, Sammons, TKR, Telecable, and Scripps Howard each have less than 5% totaling 32.8% in all.	Jun-80
USA Network	61.2	Viacom 50%	Apr-80
Nickelodeon/Nick at Nite	60.9	Viacom 100%	Apr-79
Discovery	60.5	TCI 49%, Cox 24%, Newhouse 24%	Jun-85
TBS	60.5	Time Warner 19.5%, TCI 23.3%, Times Mirror, Cablevision, Comcast, Continental, Jones, Lenfest, Sammons, TKR, Telecable, and Scripps Howard each have less than 5% totaling 32.8% in all.	Dec-76
TNT	60	Time Warner 19.5%, TCI 23.3%, Times Mirror, Cablevision, Comcast, Continental, Jones, Lenfest, Sammons, TKR, Telecable, and Scripps Howard each have less than 5% totaling 32.8% in all.	Oct-88
C-Span I	59.8	1/	Mar-79
MTV	59.5	Viacom 100%	Aug-81
Lifetime	58.6	None	Feb-84
TNN (The Nashville Network)	58.1	Gaylord Broadcasting Co. 100%	Mar-83
Family	57.9	Liberty Media/TCI 18.1%	Apr-77
Arts & Entertainment Network	57.1	None	Feb-84
The Weather Channel	55.4	None	May-82
Headline News	53.2	Time Warner 19.5%, TCI 23.3%, Times Mirror, Cablevision, Comcast, Continental, Jones, Lenfest, Sammons, TKR, Telecable, and Scripps Howard each have less than 5% totaling 32.8% in all.	Jan-82
CNBC	50.6	None	Apr-89
VH-1	49.6	Viacom 100%	Jan-85
QVC	46.3	Liberty Media/TCI 28.2%, Comcast 16.4%, Time Warner 10.7%, Cablevision, Colony, Continental, Newhouse, Sammons, and Times Mirror each have less than 5% totaling 42% in all. 2/	Nov-86
AMC (American Movie Classics)	44.5	Cablevision 75%	Oct-84
BET	39.6	TCI 21.4%, Time Warner 17.7%	Jan-80
WGN	35.1	None	Nov-78
Prevue Channel	32.3	None	Jan-88
EWTN	32	None	Aug-81
Comedy Central	30.3	Time Warner 50%, Viacom 50%	Apr-91
C-Span II	29.7	1/	Jun-86

This table was derived from the Economists Inc. study, which was submitted as part of NCTA's Comments, Attachment C, Table 3. Ownership data was derived from Table 6, and sources cited therein, and includes both direct and indirect ownership interests.

1/ According to the NCTA, cable affiliates provide 95 % of funding but have no ownership or program control interests. SEE NCTA Comments, Attachment C, Table 3.

2/ Comcast and Liberty Media have reportedly created a partnership to hold QVC interests, through which Comcast would own 57.56%

Table 8

**Vertical Integration: Top Fifteen
Programming Services (By Primetime Rating)**

<u>Rank</u>	<u>Service</u>	<u>Launch</u>	<u>MSOs with Ownership Interest</u>
1	USA Network	Apr-80	Viacom 50%
2	TBS	Dec-76	Time Warner 19.5%, TCI 23.3%, Times Mirror, Cablevision, Comcast, Continental, Jones, Lenfest, Sammons, TKR, Telecable and Scripps Howard have less than 5% totaling 32.8% in all.
3	TNT	Oct-88	Time Warner 19.5%, TCI 23.3%, Times Mirror, Cablevision, Comcast, Continental, Jones, Lenfest, Sammons, TKR, Telecable and Scripps Howard have less than 5% totaling 32.8% in all.
4	ESPN	Sep-79	None
5	Cartoon	Oct-92	Time Warner 19.5%, TCI 23.3%, Times Mirror, Cablevision, Comcast, Continental, Jones, Lenfest, Sammons, TKR, Telecable and Scripps Howard have less than 5% totaling 32.8% in all.
6	Nickelodeon/Nick at Nite	Apr-79	Viacom 100%
7	Lifetime	Feb-84	None
8	Family	Apr-77	Liberty Media/TCI 18.1%
9	Arts & Entertainment	Feb-84	None
10	Discovery	Jun-85	TCI 49%, Cox 24%, Newhouse 24%
11	TNN	Mar-83	Gaylord Broadcasting 100%
12	CNN	Jun-80	Time Warner 19.5%, TCI 23.3%, Times Mirror, Cablevision, Comcast, Continental, Jones, Lenfest, Sammons, TKR and Scripps Howard have less than 5% totaling 32.8% in all
13	MTV	Aug-81	Viacom 100%
14	BET	Nov-78	TCI 21.4%, Time Warner 17.7%
15	Sci-Fi	Sep-92	Viacom 50%

Ranking source: *Average Prime-Time Ratings 1994*, Cable TV Programming, August 29, 1994 at 6.

This table was derived from the Economists Inc. study. NCTA Comments, Attachment C, Table 4. Ownership data was derived from Table 6, and sources cited therein, and includes both direct and indirect ownership.

Table 9

**National Programming Services with 50% or Greater
Ownership Interests by Cable Operators**

Ownership Interests	Service (rank)	Total Subscribers of MSOs with Potential Ownership Interests	Market Penetration	Actual Subscribers	Actual Market Penetration
Cablevision 50%, NBC 50%	Bravo	2,155,000	3.63%	12,650,000	21.32%
Gaylord Broadcasting 100%	KTVT	63,195	0.11%	2,400,000	4.05%
	TNN (11)			58,100,000	97.92%
Gaylord Broadcasting 67%, Group W Satellite 33%	Country Music Television			25,900,000	43.65%
Jones Intercable/Jones Spacelink	Mind Ext. Univeristy	1,261,000	2.13%	25,000,000	42.14%
Lenfest 50%(voting control), Liberty Media 7%, Newhouse 17%	The Box	12,538,060	21.13%	16,000,000	26.97%
Cablevision 75%, NBC 25%	American Movie Classics AMC	2,155,000	3.63%	44,500,000	75.00%
Liberty Media 40% (79% voting control)	Home Shopping Network I	10,484,060	17.67%	21,000,000	35.39%
	HSN II			13,000,000	21.91%
Liberty Media 90%, John Sie 10%	Encore			4,100,000	6.91%
Viacom 100%	All News Channel	1,096,000	1.85%	n/a	n/a
	Flix!			125,000	0.21%
	The Movie Channel			2,700,000	4.55%
	MTV (13)			59,500,000	100.28%
	MTV Latino			640,000	1.08%
	Nickolodeon (5)			60,900,000	102.64%
	Nick at Nite (5)			51,250,000	86.38%
	Showtime			7,600,000	12.81%
	VH-1			49,600,000	83.60%
Viacom 50%, MCA 50%	Sci-Fi Channel			15,600,000	26.29%
	USA Network (1)			61,200,000	103.15%
Time Warner 100%	Cinemax	7,232,000	12.19%	6,900,000	11.63%
	HBO			17,900,000	30.17%
Time Warner 50%, Viacom 50%	Comedy Central	8,328,000	14.04%	30,300,000	51.07%

Ownership data derived from Table 6 and includes both direct and indirect ownership interests.
Total U.S. basic cable subscriber numbers derived from NCTA Comments, Attachment B.
Programming service subscribers derived from *Database*, Cablevision, Apr. 25, 1994, at 44.

Table 10

**Programming Services with Minority Ownership Interests
by Cable Operators**

One MSO With Minority Ownership Interests

Ownership Interests	Service (rank)	Total Subscribers of MSOs with Ownership Interests	Potential Market Penetration	Actual Subscribers	Actual Market Penetration
Liberty Media 18.1%, Public 47.7%, Regent 10.3%, CBN 4.9%, Class A 10.3%, Mgmt 3.7%	Family (10)	10,484,060	17.67%	57,900,000	97.59%
Liberty Media 18%	Cable Health Club			600,000	1.01%
Reiss Media 100%	Request 3-5	10,484,060	17.67%	n/a	n/a
(TCI/News Corp majority owner)	Request Television			17,000,000	28.65%
	Request Television 2			n/a	n/a

Multiple MSO Owners With Aggregate Interests Greater Than 50%.

Ownership Interests	Service (rank)	Total Subscribers of MSOs with Ownership Interests	Potential Market Penetration	Actual Subscribers	Actual Market Penetration
Adelphia Communications, CVI, Colony, Continental, C-TEC, Landmark, Scripps-Howard, Tribune, Times Mirror	Television Food Network	10,682,000	18.00%	7,500,000	12.64%
Continental 12%, Comcast 11%, Cox 20%, Newhouse 11%, Telecable, Viacom 11%, Time Warner 17%, Disney	Viewers Choice 1	19,079,000	32.16%	12,000,000	20.23%
	Viewers Choice 2			4,000,000	6.74%
	Viewers Choice Continuous Hits 1			2,000,000	3.37%
	Viewers Choice Continuous Hits 2,3			n/a.	n/a
Liberty Media 28.2%, Comcast 16.4%, Time Warner 10.7%, Barry Diller 2.3 %, Cablevision, Colony, Continental, Newhouse, Sammons, Times Mirror each hold less than 5%, totalling 42%	QVC	29,976,060	50.52%	46,300,000	78.04%
	QVC Fashion Channel			7,600,000	12.81%
Liberty Media 33%, Time Warner 33%, Cablevision 16.7%, NBC 16.7%	Court TV *	19,871,060	33.49%	14,800,000	24.94%
Liberty Media 38%, Cablevision 25%	Prime SportsChannel Network	12,639,060	21.30%	n/a.	n/a
	NewSport			n/a.	n/a

Table 10

Owners	Service (rank)	Total Subscribers of MSOs with Ownership Interests	Potential Market Penetration	Actual Subscribers	Actual Market Penetration
TCI 10.03%, Cox 10.3%, Continental 10.3%, Comcast 10.3%, Newhouse 10.3%, Time Warner 48.3%	E! (Movietime) *	26,468,060	44.61%	26,000,000	43.82%
TCI 49%, Cox 24%, Newhouse 24%, John Hendricks 3%	Discovery (6)	13,662,060	23.03%	60,500,000	101.97%
	The Learning Channel			28,300,000	47.70%
Ted Turner 28%, Time Warner 19.5%, TCI 23.3%, Cablevision, Comcast, Continental, Jones, Lentfest, Sammons, Times Mirror, TKR, Telecable, Scripps Howard hold less than 5% each for a total of 32.8%	Cartoon Network	31,749,060	53.51%	10,200,000	17.19%
	CNN (9)			61,600,000	103.82%
	Headline News (14)			53,200,000	89.66%
	TBS (2)			60,500,000	101.97%
	TNT (3)			60,000,000	101.13%
	Turner Classic Movies			n.a	n/a

Multiple MSO Ownership With Aggregate Interests of Less Than 50%

Ownership Interests	Service (rank)	MSOs with Ownership Interests	Potential Market Penetration	Actual Subscribers	Actual Market Penetration
Robert Johnson 55.2%, Liberty Media 21.4%, Time Warner 17.8%	Action Pay Per View	17,716,060	29.86%	6,300,000	10.62%
	BET			39,600,000	66.74%

Ownership data derived from Table 6 and includes both direct and indirect ownership interests. Total U.S. basic cable subscriber numbers derived from NCTA Comments, Attachment B. Programming service subscribers derived from *Database*, Cablevision, Apr. 25, 1994, at 44.

* Court TV and E! are managed by divisions of Time Warner. See Time Warner, Inc., 1993 Annual Report at 48.

APPENDIX H

ECONOMIC CONCEPTS FOR ASSESSING THE EXTENT OF COMPETITION IN VIDEO PROGRAMMING DISTRIBUTION MARKETS

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1. This Appendix describes certain economic concepts applied in this *Report* but not fully explained in the text of the *Report* itself. Additionally, certain additional economic information and analysis are provided that supplement the discussion in Section V that addresses the status of competition in multichannel video distribution markets. More specifically, Section I of this Appendix reviews the demand-side concepts of *own-price elasticity of demand*, *market power*, the *implicit Lerner Index*, and the *q ratio*. Section II reviews the supply-side concepts of *economies of scale and scope* and *barriers to entry*. The distinction between *fixed* and *sunk costs* is emphasized together with a brief analysis of the possible effects of sunk costs on long term market structure for local multichannel video programming distribution markets. Finally, Section III briefly addresses certain methodological issues raised in the *Notice of Inquiry* in this proceeding.

I.

DEMAND-SIDE CONCEPTS: MARKET POWER, OWN-PRICE ELASTICITY OF DEMAND, AND THE LERNER INDEX

A. Own-Price Elasticity of Demand and Market Power

2. The nature of demand for any product or service is an important basic condition affecting market structure. In particular, the degree of consumer price sensitivity or to *own-price elasticity of demand*, is an indicator of the availability of competing substitute products or services.¹ If consumer demand at observed market prices tends to be relatively insensitive to the level of market price, then it is likely that the product or service faces extremely limited competition from actual or potential substitute goods. If the supplier of such a product or service is a monopolist, then it is possible that observed market price will exceed the price that would otherwise prevail if either more competitors were supplying the market or other products or services were highly substitutable for the given product or service. In other words, measures of end-user price sensitivity are important in assessing the *market power* of suppliers.

¹ Own-price elasticity of demand, η , is defined in this Appendix as the absolute value of the percentage change in the quantity demanded (or movement along a given demand curve) for a given percentage change in unit price, all other things, such as product or service quality, held constant. It is understood that the own-price of output varies inversely with the quantity demanded, and the negative sign associated with measures of own-price elasticity is suppressed for simplicity. Demand is *elastic* at the current price and output if $|\eta| > 1$; the percentage change in quantity demanded exceeds the percentage change in price. If $|\eta| < 1$, demand is *inelastic*. If consumers are very sensitive to changes in price, then demand will be elastic as small price increases greatly reduce the quantity purchased of any given good or service. For example, an own-price demand elasticity of $|\eta| = 2$ implies a 20% decrease in quantity demanded will follow a 10% increase in price. Conversely, if consumers are not very sensitive to price changes, demand will tend to be inelastic.

3. Market power refers to the ability of a firm, or group of firms, to set price profitably above the competitive level and maintain such a price over time without attracting competitive entry. In a perfectly competitive market, equilibrium price is equal to marginal cost.² Thus, if output price persistently remains above marginal cost over time, the firm does not face perfect competition and has, at least, some market power. The *existence* of market power is distinguished, however, from the *extent* of market power, since small deviations from marginal cost pricing will not, in general, imply serious distortions in market performance.

B. The Implicit Lerner Index

4. To assess the extant market power of local cable systems, this *Report* applies two commonly used measures of market power, namely, (1) the *Lerner Index*; and (2) the *q Ratio*. The Lerner Index establishes a direct relationship between market power and the own-price elasticity of demand and is defined as $L = [(p - MC)/p]$, where p and MC measure the unit output price and the marginal cost of production, respectively. The q ratio is the ratio of the market value of cable system assets to the replacement value of such assets and is described in Section I.C of this Appendix.

5. In most cases, it is difficult to compute reliable estimates of marginal cost at the equilibrium level of output. Consequently, *direct* estimates of the Lerner Index of market power are often impossible to compute. As an alternative methodology, the first-order condition for monopoly profit maximization can be used to compute an *implicit* estimate of the Lerner Index. The divergence of price from marginal cost can be formalized as the *Implicit Lerner Index* of market power which is given by the formula $L = [(p - MC)/p] =$

² A high price-cost margin, i.e., $[(p - MC)/p]$, where p measures the unit price of output and MC measures the marginal cost of production, does not necessarily imply that the firm earns *excess economic profits*, i.e., revenues in excess of what is required to compensate all inputs of production their opportunity costs. If the technology of production implies economies of scale at the observed level of production, then marginal cost for a single output will be *less* than average cost, and setting price equal to marginal cost will result in total revenue less than the total cost of production. Thus, the firm will necessarily set price *greater* than marginal cost, although no excess economic profits will be realized if total cost just equals total revenue. Under these special circumstances, output prices that (1) represent different markups over the marginal cost of production for each output as determined by the own-price elasticity of demand for each individual output, and that (2) constrain the the sum of markups over marginal cost for all outputs to just recover the total shortfall in revenue that might otherwise result if prices were set at marginal cost are called *Ramsey prices* and represent second-best, economically-efficient prices in the presence of economies of scale. In the case of a single output, the Ramsey price is equal to the average cost of production for any given level of output. For further discussion of Ramsey pricing, see William J. Baumol & David F. Bradford, *Optimal Departures from Marginal Cost Pricing*, 60 AM. ECON. REV. 265-83 (1970). See also STEPHEN J. BROWN & DAVID S. SIBLEY, *THE THEORY OF PUBLIC UTILITY PRICING* ch. 3 (1986).

$(1/|\eta|)$, where η measures the own-price elasticity of demand.³ Given reliable estimates of the own-price elasticity of demand, η , the extent of market power can be *inferred* indirectly without the requirement of estimating marginal cost at the profit-maximizing level of production.

6. The Lerner Index is a measure of the extent of market power. If the elasticity of demand for a firm's product is infinite, as it is in a perfectly competitive market, then the deviation of price from marginal cost is zero. As illustrated by the Lerner Index, the larger in absolute value is the own-price elasticity of demand, the smaller the divergence between monopoly and competitive price, where competitive price is just equal to marginal cost in the absence of economies of scale.⁴ As the number of substitutes for cable service increases, the elasticity of demand for video programming services offered by incumbent cable systems will increase. Thus, even if competition in local cable markets is between a few firms selling somewhat differentiated products, such rivalry may significantly increase the elasticity of demand for each of the rivals' services and eliminate significant deviations of price from marginal cost.

³ The Implicit Lerner Index is itself subject to important limitations. For example, it is assumed that the estimate of the own-price elasticity of demand used to estimate the Implicit Lerner Index corresponds to the profit-maximizing value of the own-price elasticity of demand along the monopolist's demand curve. This assumption may or may not be troublesome, depending on the correct specification of the firm's demand function. If the correctly-specified demand function facing a cable system is linear, then the own-price elasticity of demand will vary continuously as the quantity demanded changes. Conversely, if the correctly-specified demand function is log-linear, then the own-price elasticity of demand is constrained to a constant value regardless of the level of quantity demanded. If quantity demanded is specified as the penetration rate, a logit transformation of the penetration rate allows for estimation of the own-price demand elasticity at different levels of quantity demanded, i.e., penetration rates. See KENT WEBB, *THE ECONOMICS OF CABLE TELEVISION* ch. 4 (1983). To avoid possible bias in the measurement of the extent of market power induced by selecting an incorrect estimate of the own-price elasticity of demand, a range of possible own-price elasticities of demand found in the empirical literature was assumed to "bracket" correct values. In addition, empirical own-price elasticities inconsistent with monopoly profit-maximization were excluded. See Section I.D and Table H-1 in this Appendix.

⁴ When measuring the extent of market power of a given firm, the *market* and the *firm* demand curves must be carefully distinguished. If the entire market is served by a single firm, i.e., a monopoly, then the market demand curve is equivalent to the firm demand curve. Under perfect competition, each firm's demand curve is perfectly elastic and the market demand curve does not coincide with the firm demand curve. To the extent that monopoly cable systems begin to face competition from overbuilders or other technologies for distributing multichannel video programming, then local cable operators will face a *residual demand curve* -- the horizontal distance between the market demand curve and the total fringe supply -- that will tend to become more elastic over time and, therefore, tend to decrease the incumbent's market power.

7. If the own-price demand elasticity of a dominant firm facing some competition is not known, the *market share* of the dominant firm, i.e., the percentage of total industry output supplied by the firm, can sometimes be used to compute the extent of market power. Given certain assumptions, the market power of a dominant firm, such as a local cable system beginning to face some competition, can be estimated using an estimate of the firm's market share; the own-price elasticity of the market demand curve; and the *supply elasticity* of rival firms, i.e., the percentage increase in quantity supplied by rival firms given a one percent change in output price. In this case, the Lerner Index, or the price-cost margin, can be written more generally as $L = S_D / [\eta_m + \epsilon_s(1 - S_D)]$, where S_D is the market share of the dominant firm; η_m is the market own-price demand elasticity; and ϵ_s is the supply elasticity of the rival or fringe firms.⁵ From this equation, it is apparent that the larger the market share of the dominant firm, the greater its market power, other things remaining the same. The larger (in absolute value) the market demand elasticity, other things equal, the larger will be the dominant firm's own-price demand elasticity and the smaller the deviation of price from marginal cost. The larger the supply elasticity of the competitors, measured by the ability of existing firms to increase output as well as new firms to enter the market, the larger the own-price demand elasticity of the dominant firm and, therefore, the lower its market power.⁶

C. The q Ratio

8. An alternative measure of market power is the q ratio, which is the ratio of the market value of a firm (measured by the market value of its outstanding stock and debt) to the replacement cost of the firm's physical assets.⁷ If the market value of a firm is greater than its replacement cost, excess economic profits are being earned.⁸ The market value of a

⁵ See William M. Landes & Richard A. Posner, *Market Power in Antitrust Cases*, 94 HARV. L. REV. 937-96 (1981).

⁶ The simple, inverse-elasticity Lerner Index is a special case of the market-share Lerner Index just described. If the entire output of a single-product industry is supplied by a single firm, the market share of that firm is 100%, and the market demand curve is equivalent to the firm demand curve. In this special case, the market-share Lerner Index collapses into the simple, inverse-elasticity Lerner Index. Under these circumstances, η_m is equal to η , and the expression $\epsilon_s(1 - S_D)$ reduces to zero, since S_D is equal to one. An assumption inherent in the simple, inverse-elasticity Lerner Index is that the monopoly firm faces no potential competitors or that such potential competitors do not as yet provide any constraint on the exercise of monopoly power by the monopoly firm.

⁷ The q ratio as an indicator of market performance was proposed by James Tobin. See James Tobin, *A General Equilibrium Approach to Monetary Theory*, 1 J. MONEY CREDIT & BANKING 15-29 (1969).

⁸ DENNIS W. CARLTON & JEFFREY M. PERLOFF, *MODERN INDUSTRIAL ORGANIZATION* 343 (2d ed. 1994).

firm consists of three components, namely, the capitalized value of rents attributable to monopoly power; scarce factors of production; and the firm's existing capital stock.⁹ The magnitude of the capitalized value of these rents is reflected by the extent that the q ratio exceeds one.¹⁰ The size of these rents reflects earnings in excess of the amount necessary to compensate all factors of production at rates equal to their full opportunity cost. The q ratio is a measure of long-run profitability, which makes it useful for measuring monopoly power for public policy considerations.¹¹ The q ratio is often a preferable measure of profitability compared to the price-cost margin, since the difficulties in measuring marginal cost are avoided.

9. While the q ratio is an alternative to the Lerner Index as a measure of market power, the two measures can be directly linked under certain conditions. It can be shown that $q = 1 + (1/|\eta|)(R/K)[1/(\rho - g)]$, where R is the firm's revenue for a given period of time; K is the dollar value of the firm's capital stock; $(1/|\eta|)$ is the simple Lerner Index; ρ is the long term discount rate; and g is the projected long term percentage growth rate of revenue.¹² From this equation, it is apparent that the Lerner Index $(1/|\eta|)$ and the q ratio tend to be correlated: large q ratios will be associated with large Lerner Indices, other things remaining constant. Much like the simple, inverse-elasticity Lerner Index, the q ratio measure of profitability is highly sensitive to the own-price elasticity of demand. If the firm sells its output in perfectly competitive output markets, then the firm's own-price elasticity of demand approaches infinity, and its inverse, $(1/|\eta|)$ or the simple Lerner Index, necessarily approaches zero in value. As a result, the expression $(1/|\eta|)(R/K)[1/(\rho - g)]$ must also approach zero, and the q ratio converges to one in value, where by definition, the firm possesses no market power. Thus, it is apparent that q values in excess of one imply the exercise of market power, absent measurement problems or substantial violations of other assumptions inherent in the definition of q.

10. As noted in the *1990 Report*, q ratios in excess of one may be attributable to factors other than excess economic profits. Since the q ratio is a fraction, incorrect estimates in either the numerator or denominator can have significant effects on the q estimates. Thus, inaccurate measures of either the market value or replacement costs of a firm's tangible assets

⁹ Michael Spirlock, Thomas Gilligan, & William Marshall, *Tobin's q and the Structure-Performance Relationship*, 74 AM. ECON. REV. 1051-60 (1984).

¹⁰ *Id.*

¹¹ Michael A. Salinger, *Tobin's q, Unionization, and the Concentration-Profits Relationship*, 15 RAND J. ECON. 159-70 (1984).

¹² *Id.* at 161. This definition of the q ratio assumes long-run equilibrium with constant returns to scale in the production of output; no taxes or inflation; and all future profits accrue to capital. If the production process is characterized by economies of scale, then the simple Lerner Index, $[(p - MC)/p] = 1/|\eta|$, must be replaced with $[(p - AC)/p]$ where p is the unit price of output and AC is the average cost of production. Therefore, the q ratio, under increasing returns to scale, reflects the markup of price over the average cost of production.

can produce imprecise and misleading measures of q .

11. In general, the market value of a firm, the numerator of the q ratio, can be accurately estimated by summing the value of securities, i.e., stocks and bonds, issued by the firm. This approach is referred to as the "public" market value. However, if stock market values are extremely volatile, then this approach will produce less reliable estimates of firm value.¹³ For example, if the data are limited to a specific year, or even month, the value of securities may produce misleading estimates of the q ratio, if stock prices are abnormally high at that given time. This particular problem is minimal if stock prices are not volatile or the data are drawn from different time periods.

12. It is far more difficult, however, to obtain an estimate of the replacement value of the firm, the denominator of the q ratio. One particular measurement problem is the exclusion of the value of intangible assets, such as goodwill, in the estimate of replacement cost. If advertising, or some other factor, generates a positive amount of goodwill, the q ratio will typically exceed one, since goodwill will increase the market value of the firm but not its replacement value. In addition, since the assets of the firm are "used," estimated replacement costs may be affected by the particular accounting method chosen to adjust the assets for depreciation.¹⁴ Again, inaccuracies in the measurement of replacement cost will result in a q ratio greater than one, even if excess economic profits are zero.

13. Moreover, a particular firm's q ratio may be greater than one as a result of superior management skills or exceptionally efficient productive methods. Neither of these factors will be reflected in the estimate of replacement cost, but both will most likely affect the market value of the firm. It seems unlikely, however, that superior management skills or efficient production techniques can explain a significant portion of a cable firm's profits, given the current lack of effective competitive constraints on cable operators. Therefore, these factors are unlikely to have a significant effect on estimates of q for many, if not most, cable systems today.¹⁵

14. Notwithstanding the possible conceptual limitations of the q ratio as a measure of market power, the estimated q ratios reported in Table 5.2 in the text of this report are so

¹³ See R.J. Shiller, *Do Stock Prices Move Too Much to Be Justified by Subsequent Changes in Dividends?*, 71 AM. ECON. REV. 431-36 (1981).

¹⁴ For a comprehensive analysis of these issues, see Spirlock, Gilligan, & Marshall, *supra* note 9.

¹⁵ While high profits may be related to risk rather than monopoly power, the q ratio includes an automatic adjustment for risk. See Salinger, *supra* note 11; Spirlock, Gilligan & Marshall, *supra* note 9. With respect to superior management skills, the value of the firm will only be affected to the extent that the managers do not capture for themselves the rents produced by their skill. The effects of superior management skills on the value of cable systems are addressed in the 1990 Cable Report, Appendix E.

far above the benchmark value of one that it appears difficult to contradict the hypothesis of substantial market power in local cable distribution markets. Details describing the estimation of the q ratios and the pertinent assumptions made in the various computations are provided in Appendix I.

D. Empirical Studies on the Own-Price Elasticity of Demand for Basic Cable Services

15. The calculation of implicit Lerner Indices requires robust econometric estimates of the own-price elasticity of demand for cable services, especially basic cable service. Fortunately, a number of recent econometric studies of the demand for basic cable service report estimates of the own-price elasticity of demand. These econometric studies provide various estimates of the own-price elasticity of demand for both basic and pay cable services. The econometric estimates of own-price elasticities for some of the more recent empirical studies are reported in Table H-1.¹⁶ Most empirical studies relate the unit price of cable service to either (1) the *number of subscribers* or (2) the *penetration rate* defined as the number of households subscribing to either basic or pay cable service divided by the number of households passed by cable.¹⁷ The own-price elasticity estimates are broadly similar

¹⁶ See * Robert W. Crandall, *Elasticity of Demand for Cable Services and the Effect of Broadcast Signals on Cable Prices*, paper appended to *TCI Reply Comments* in Mass Media Docket 90-4; ** Robert N. Rubinovitz, *Market Power and Price Increases for Basic Cable Service Since Deregulation*, 24 RAND J. ECON. 1-18 (Spring 1993); *** Tasneem Chipty, *Horizontal Integration for Bargaining Power: Evidence from the Cable Television Industry*, paper presented at the *AEI Telecommunications Summit: Competition and Strategic Alliances*, American Enterprise Institute, July 7, 1994; **** J. Mayo and Y. Otsuka, *Demand, Pricing and Regulation: Evidence From the Cable TV Industry*, 22 RAND J. ECON. 396-410 (Autumn 1991); ***** R. Beil, T. Dazzio, R. Ekelund & J. Jackson, *Competition and the Pricing of Cable Television Services*, 6 J. REG. ECON. 401-15 (December 1993); ***** George Ford, *Competition in the Cable Television Industry: An Economic Analysis of Overlap Variations and Cable Prices* (unpublished doctoral dissertation completed at Auburn University, 1994).

¹⁷ The penetration rate expresses the number of subscribers in relation to the *potential* market demand for any defined franchise area, *i.e.*, homes passed. The penetration rate provides several advantages as a measure of cable system demand. First, since the penetration rate is measured as a ratio or percentage, it is not affected by the size of the cable system. Thus, penetration rates for both large and small cable systems can be usefully compared. Second, weighting the quantity of subscribers by the reciprocal of homes passed corrects for heteroskedasticity in the regression analysis. Using the penetration rate as a quantity measure neither affects the interpretation of demand elasticity nor its relevance in calculating the Lerner Index, as the penetration rate is merely an alternative measure of quantity demanded. Since demand elasticity is itself dimensionless, it should be unaffected by the penetration rate transformation.

despite different econometric specifications, estimation methodologies, and data sets.¹⁸

16. The Crandall study estimates two demand model specifications, namely, Specification 1 that constrains the estimated elasticity to be a constant for all values of cable price and number of subscribers; and Specification 2 that permits the estimated elasticity to vary for different values of cable price and number of subscribers. As shown in Table H-1, the estimated own-price elasticities were not dramatically affected by the different instrument sets. Crandall's results suggest that the own-price elasticity of demand for basic cable service tends to be elastic, ranging from approximately 1.6 to 3.4, depending upon the model specification and instrument set. The Rubinovitz and Beil, et al., studies also show that the demand for basic cable tends to be elastic, although somewhat less elastic than shown in the Crandall study. Mayo and Otsuka find demand to be close to unity across the markets in their sample. According to their estimates, demand elasticities tend to be higher in urban areas and larger television markets. The Chipty study estimates own-price elasticities of demand for both basic and pay cable service. Again, these empirical estimates tend to show that the demand for basic (and pay) cable services are elastic. Finally, the Ford study shows that in duopolistically-competitive cable markets, the demand curve faced by the cable system operator is more elastic than in markets where competition is absent, i.e., in monopoly markets.

17. Notwithstanding the differing econometric methodologies and data sets, the demand elasticities reported in Table H-1 generally suggest that the demand for cable television tends to be elastic. To the extent that existing cable rates exceed the incremental cost of production, rate reductions should be expected to increase the number of subscribers and levels of penetration, and increase revenues for local cable systems, while possibly reducing local cable system profits. To the extent that local cable rates are the result of

¹⁸ None of the studies on overbuild competition provide an estimate of the *cross-price elasticity of demand*, i.e., the extent to which the quantity sold of one firm's product is affected by a change in the price of a related product, other things remaining the same. If the cross-price elasticity is positive, the products are *substitutes*; if negative, the goods are *complements*. Given that the own-price demand elasticity for a product or service is affected by the number of substitutes for that product or service, it can be shown that the higher the positive value of the cross-price elasticity between two rival cable operators' services, the larger will be the absolute value of a firm's own-price elasticity of demand for its particular services. Thus, the larger the cross-price demand elasticities between the services offered by two rival cable firms, the less likely it is that either firm will possess significant market power, since market power is inversely related to the own-price demand elasticity as illustrated by the implicit Lerner Index. For a general discussion of cross-price elasticity, including its relationship to the own-price elasticity of demand, see CARLTON & PERLOFF, *supra* note 8, at 807. Today, econometric estimation of cross-price demand elasticities between rival cable operators is hindered by multiple problems, including the wide variations in the extent of system overlap between competing systems and other data and statistical difficulties. As competition develops in the cable industry, estimating cross-price elasticities may become feasible.

monopoly power exercised by local cable systems, additional competition should result in rate reductions for basic cable service as the elasticity of demand for the cable operator increases, a result consistent with the results reported in Ford's study.

TABLE H-1

**ECONOMETRIC ESTIMATES OF OWN-PRICE ELASTICITY
OF DEMAND FOR CABLE TELEVISION**

Study	Demand Measure		Own-Price Elasticity Estimate ($ \eta $)
	Number of Subscribers	Penetration Rate	
Crandall (1990)*			
Instrument Set A			
Specification 1	X		1.760
Specification 2	X		2.329
Instrument Set B			
Specification 1	X		2.134
Specification 2	X		3.375
Instrument Set C			
Specification 1	X		1.578
Specification 2	X		2.151
Rubinovitz (1993)**	X		1.46
Chipty (1994)***			
Basic Cable			
Minimum Value		X	1.054
Maximum Value		X	2.387
Mean Value		X	1.877
Pay Cable			
Minimum Value		X	1.050
Maximum Value		X	3.748
Mean Value		X	2.029
Mayo and Otsuka (1991)****			
Top 50 Markets			
Urban		X	1.51
Suburban		X	1.05
Second 50 Markets			
Urban		X	1.22
Suburban		X	0.98
Below Top 100 Markets		X	0.81
Average		X	0.969
Beil, et al (1993)*****		X	1.09
Ford (1994)*****			
Specification A			
Monopoly		X	0.87
Duopoly		X	1.51
Specification B			
Monopoly		X	1.31
Duopoly		X	2.62

Source: References cited in footnote 16.

E. Empirical Estimates of the Implicit Lerner Index

18. The econometric estimates of the own-price elasticity of demand reported in Table H-1 that are consistent with the theoretical conditions for profit-maximization range from 1.054 to 3.375.¹⁹ Table H-2 reports estimates of the Implied Lerner Indices using a representative sample of the own-price elasticities reported in Table H-1. Table H-2 also reports the *Implied Markup Factors* that are derived from an algebraic restatement of the Lerner Index. The Implied Markup Factor expresses the profit-maximizing price as some multiple of marginal cost. Firms selling their output in a perfectly competitive market would set price equal to marginal cost, implying a markup factor equal to one. Markup factors in excess of one are indicative of market power. Similarly, the value of the Lerner Index for a firm selling in perfectly competitive output markets is zero, since a competitive firm does not realize any markup over the marginal cost of production.

TABLE H-2
IMPLICIT LERNER INDICES
FOR CABLE SYSTEMS

Econometric Study	Basic Service Own-Price Elasticity of Demand [$ \eta $]	Implied Lerner Index [$1/ \eta $]	Implied Markup Factor [$ \eta /(\eta - 1)$]
Rubinovitz (1993)	1.46	0.69	3.17
Chipty (1994)	1.88	0.53	2.14
Crandall (1990)			
Specification B1	2.13	0.47	1.88
Specification B2	3.38	0.30	1.42
Ford (1994)			
Monopoly	1.31	0.76	4.22
Duopoly	2.62	0.38	1.61

Source: Table H-1.

¹⁹ An unconstrained profit-maximizing firm will always price its output in the elastic region of its demand curve where the absolute value of the own-price elasticity of demand is greater than 1. See CARLTON & PERLOFF, *supra* note 8, chs. 1, 9.

19. If it is assumed that local cable systems attempt to set profit-maximizing prices for basic cable service, then the presence of market power is implied for the range of empirical estimates of the own-price elasticity of demand shown in the second column of Table H-2.²⁰ The Implied Lerner Index suggests that the percentage markup over profit-maximizing price, i.e., $[(p - MC)/p]$, ranges from thirty to seventy-six percent. Similarly, the Implied Markup Factors range from 1.42 to 3.50.²¹ With regard to overbuild competition, the Implied Markup Factors produced using Ford's own-price demand elasticity estimates clearly show that such competition diminishes market power.

II. SUPPLY-SIDE CONCEPTS

A. Economies of Scale and Scope

20. Changes in the cost of production as output expands may have an important effect on market structure. If, for example, the average cost of production is little affected by the quantity produced by any given firm in an industry, then the market might be supplied by many firms, with no individual firm having any important cost advantage relative to any other. In other words, the *scale* of production does not affect the cost of production for any firm in the industry. Under these circumstances, market structure may resemble a perfectly competitive industry, unless various types of barriers to entry preclude competitive entry.

21. Conversely, should the expansion of output by any given firm result in a *reduction* in the average cost of production as higher-capacity facilities are used to produce higher volumes of output, then market structure may be dominated by a few firms that supply the entire market. In such a case, each firm realizes *economies of scale* in the production of output, although such production economies are usually exhausted at sufficiently large

²⁰ Crandall, in his study cited in Table H-2 that uses TCI cable system cost data, estimates the price-cost ratio for a representative TCI cable system as approximately 2.0. This price-cost ratio is quite close to the implied markup factor of 1.88 implied by Crandall's estimated own-price elasticity of demand equal to 2.134 as shown in Table H-2. To the extent that TCI cable systems are broadly representative of cable systems more generally, estimated own-price elasticities for basic cable service in the vicinity of 2.0 are probably consistent with profit-maximizing prices for basic cable service. See Robert W. Crandall, *supra* note 16, at 2-8.

²¹ The Implied Lerner Indices and Implied Markup Factors shown in Table H-2 are only *suggestive* of market power in local multichannel video programming distribution markets dominated by local cable systems. If the production of local cable services is subject to some economies of scale and scope in the longer term, then prices may be expected to exceed marginal cost. In other words, some excess over marginal cost may be required to recover the total cost of production even in the absence of excess economic profit. Consequently, values of Implied Lerner Indices should be compared with other measures of market power, such as *q* ratios, in order to evaluate the reasonableness of the estimated values.